OPERATING SUMMARY

MOOSONEE

1973

Ontario

MINISTRY OF THE ENVIRONMENT

MINISTER
Honourable William G. Newman

DEPUTY MINISTER
E. Biggs

ASSISTANT DEPUTY MINISTER
REGIONAL OPERATIONS
J. Barr

REGIONAL OPERATIONS DIVISION

DIRECTOR, NORTHEASTERN REGION
R. Moore

MANAGER, UTILITY OPERATIONS
J. Wesno

MOOSONEE

WATER SUPPLY SYSTEM

and

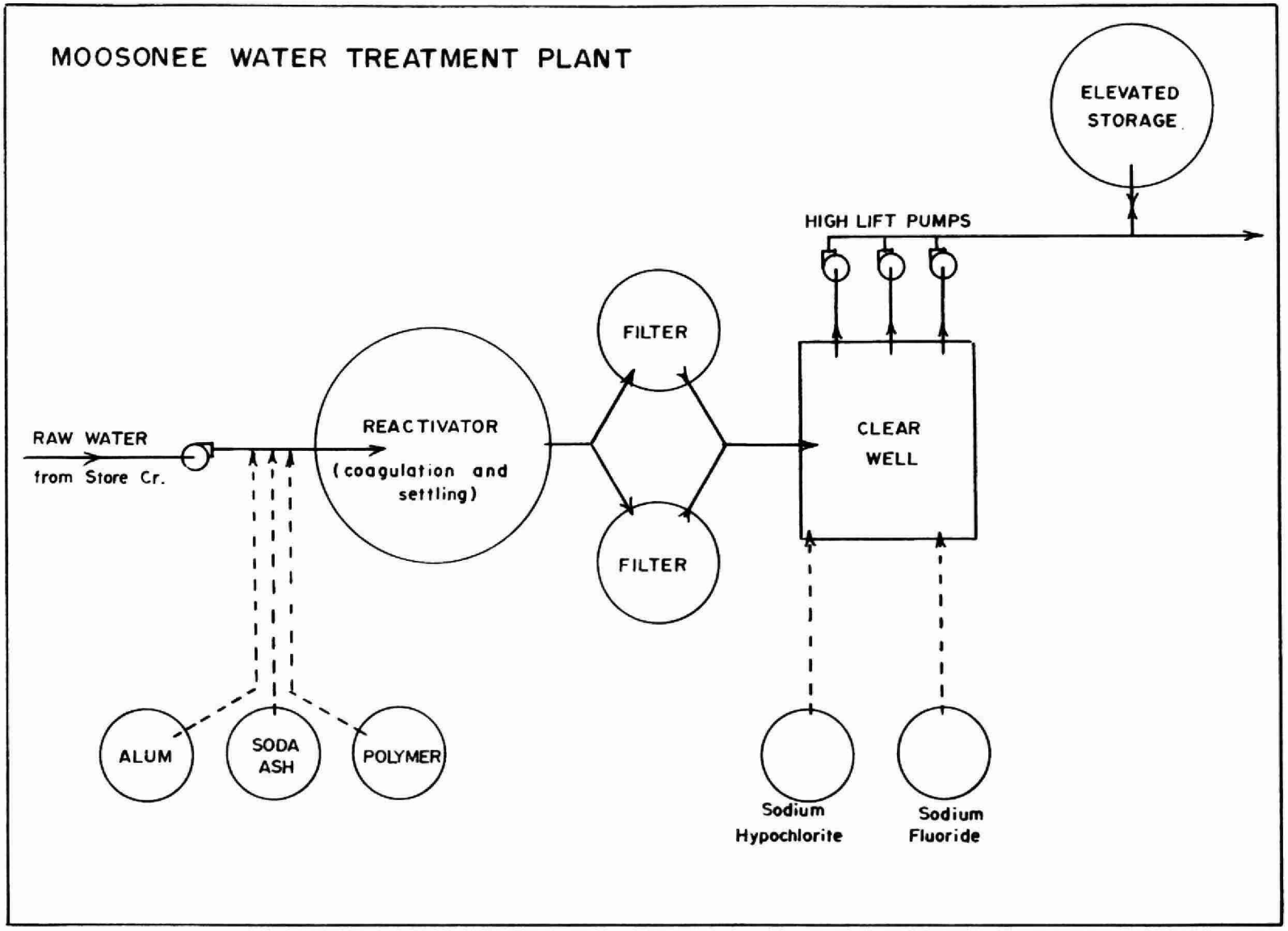
WATER POLLUTION CONTROL PLANT

MINISTRY OF THE ENVIRONMENT

1973 ANNUAL OPERATING SUMMARY

CONTENTS

WATER SUPPLY SYSTEM


MOOSONEE WATER TREATMENT PLANT
ELEVATED STORAGE
HIGH LIFT PUMPS
FILTER
FILTER
REACTIVATOR
(coagulation and settling)
RAW WATER
from Store Cr.
CLEAR WELL
ALUM
SODA ASH
POLYMER
Sodium Hypochlorite
Sodium Fluoride

DESIGN DATA

PROJECT NO. 5-0004-66
PROJECT NAME Moosonee Water Treatment Plant
NOMINAL CAPACITY 150, 000 IGPD

RAW SOURCE Store Creek

INTAKE

Steel plate guard cage
1" Steel pipe spacers
Pipe" 36' of 8" dia. to raw water well

LOW LIFT PUMPS

2 (in raw water well)
Type: Pleuger
Rate: 145 IGPM @ 72' head

FILTRATION

Type: 2 monovalve filter units - Graver 2 compartment
Size: Ht. 10'6", dia. 6'
Rate: 1.9 gpm/sq. ft. 53 gpm per filter
Backwash: Adjustable: 170 igpm
12 igpm/sq. ft.

REACTIVATOR - One

Type: Graver, 3 stage (mixing, flocculation & sedimentation)
Size: 14' dia.
Rise Rate: 1.0 gal/sq. ft. rise area
Detention Time: 114 min.
Including: variable speed recirculator
positive sludge scraper

HIGH LIFT PUMPS - 3 (in plant building)
Type: Layne & Bowler, 3 stage
Rate: 150 US gpm @ 150' TDH Layne

CHLORINATION

Type: One Wallace & Tiernan V-notch dual head pump
Rate: 30 ppm (12% Sodium hypochlorite)
Tank Size: 30" x 4.0' - 115 gal.

CHEMICAL FEED EQUIPMENT for

Alum, soda ash & coagulant aid (separan NP10)
a) one neptune 3" crest meter
b) feed tanks - 2 42' dia x 4'0" (soda ash & alum)
1 30" dia x 4'0" (separan)
c) 6 $\frac{1}{4}$h.p. agitators
d) pumps: one W&T single head, separan
two W&T dual head, alum

FLUORIDATION

Type: BIF chemo-feeder
Rate: 1 ppm Hydrofluorosilic acid @ 25%

STORAGE:

Town elevated tank: 50, 000 gal
Clear Water Well: 55, 000 gal
Raw Water Well: 72' dia - same level as creek

SCREENING

Type: Stationary
Size: $\frac{1}{4}$" holes, 4' x 4'

'73 Review

GENERAL

The Moosonee Water Treatment Plant has a capacity of 150 thousand gallons per day. Treatment consists of coarse screening, flocculation, sedimentation, sand filtration and chlorination. Raw water is taken from Store Creek. The project is operated by a chief operator and an operator who divide their duties between this project and the sewage treatment plant.

Early in the year it was realized by the Ministry that the fire fighting capability within the water supply system was below standard, due to the ever increasing demand placed on the water system by the community. The increase in demand was attributed mainly to loss of water through watermain breaks and constant running of taps to prevent freezing of lines. These problems are being studied, and a report to alleviate them should be forthcoming in 1974.

The present storage capacity would be satisfactory for the present serviced population (approximately 1125) if the per capita demand could be kept down to 75 gallons per day. The present per capita demand is 107 gallons per day.

PLANT FLOWS

The average daily flow during the year was 120 thousand gallons and is 10 per cent greater than the average daily flow in 1972.

During the year there were few major problems with the system and the average daily flow exceeded the plant design capacity only five per cent of the time. Only on twenty days of the year was it necessary to blend treated water with raw water. Last year the plant capacity was exceeded 12 per cent of the time.

CHEMICAL TREATMENT

The average chemical dosages during the year were 93.0 mg/l alum; 1.3 mg/l Separan; 73 mg/l soda ash; 1.1 mg/l fluosilicic acid as fluoride; and 2.9 mg/l sodium hypochlorite as chlorine.

The average fluoride concentration and chlorine residual in the treated water were 1.0 mg/l and 0.5 mg/l respectively.

The average treated water concentrations of iron of 0.14 mg/l, chloride at 242 mg/l and pH at 7.5 were within Ministry standards. The average turbidity of 1.5 FTU and colour of 7 apparent units slightly exceeded Ministry requirements.

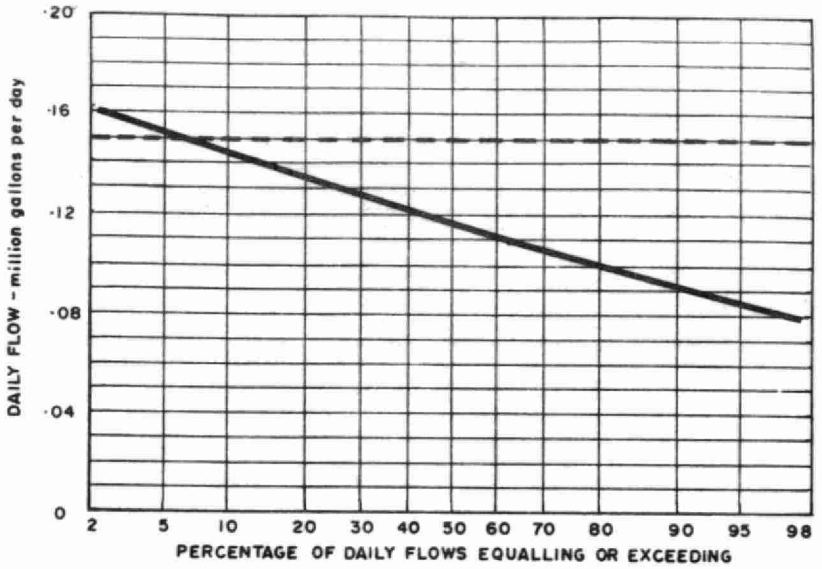
CONCLUSIONS

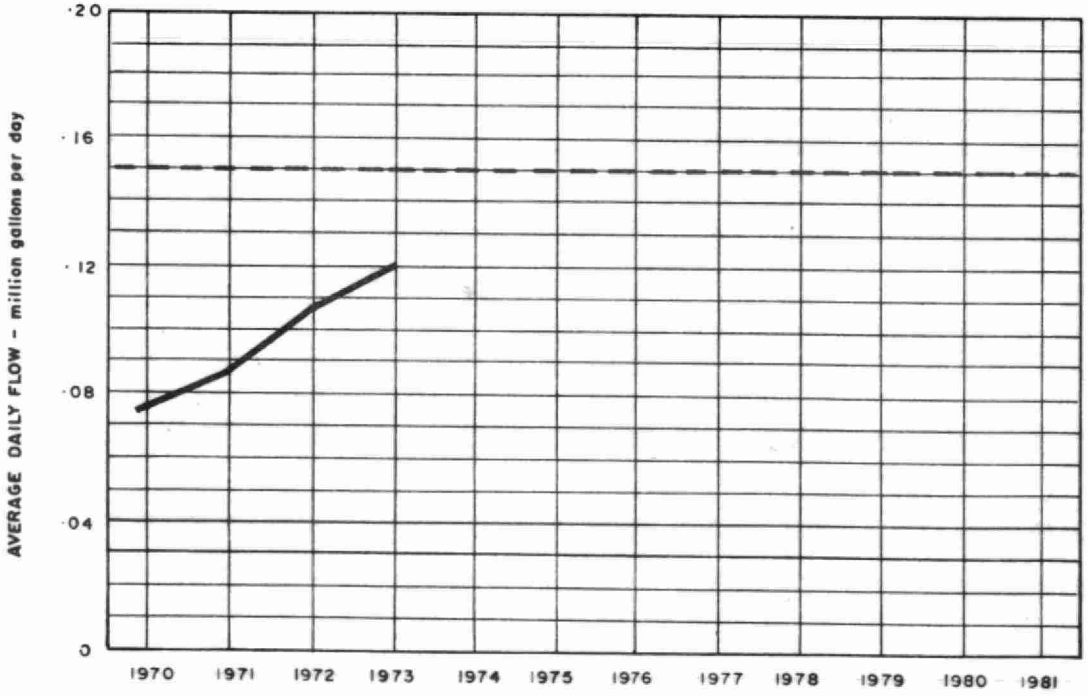
The general operation of the plant was satisfactory, and the plant supplied a good quality water to the community most of the time.

The problem of maintaining sufficient fire fighting capability in the water system is being studied.

PROCESS DATA

FLOWS





DESIGN CAPACITY _ _ _ _ _ _ _

PLANT PERFORMANCE

MONTH	FLOWS				RAW WATER		TREATED WATER					
							TURBIDITY		COLOUR		TEMPERATURE	
	TOTAL PLANT OUTPUT million gallons	AVERAGE DAILY FLOW million gallons	MAXIMUM DAY'S FLOW million gallons	MAXIMUM RATE mgd	TURBIDITY (AVERAGE) FTU	COLOUR (AVERAGE) App. units	AVERAGE FTU	MAXIMUM FTU	AVERAGE App. units	MAXIMUM App. units	AVERAGE °F	MAXIMUM °F
JAN	3.80	0.12	0.15		3.3	75	0.9	0.9	5	20	33	33
FEB	3.89	0.14	0.17		6.2	60	1.0	1.3	5	10	33	33
MAR	4.43	0.14	0.17		3.9	46	0.5	0.5	5	10	33	33
APR	3.53	0.12	0.15		3.0	52	2.8	2.8	21	40	34	34
MAY	3.96	0.13	0.16		6.4	112	1.4	1.4	5	10	39	48
JUNE	3.47	0.12	0.14		2.6	140			5	10	53	59
JULY	3.42	0.11	0.13		3.0	183	2.2	2.7	6	10	57	61
AUG	3.19	0.10	0.13			180			5	5	57	62
SEPT	2.75	0.09	0.13		3.9	147	1.1	1.7	5	5	48	56
OCT	2.86	0.09	0.13		1.5	145	1.1	1.6	5	5	44	47
NOV	3.26	0.10	0.14		1.5	150	3.2	3.2	5	15	34	35
DEC	4.21	0.14	0.16		2.2	130	2.0	2.0	6	15	34	34
TOTAL	42,77											
AVG.		0.12	MAXIMUM 0.17	MAXIMUM	3.6	118	1.5	MAXIMUM 3.2	7	MAXIMUM 40	42	MAXIMUM 62

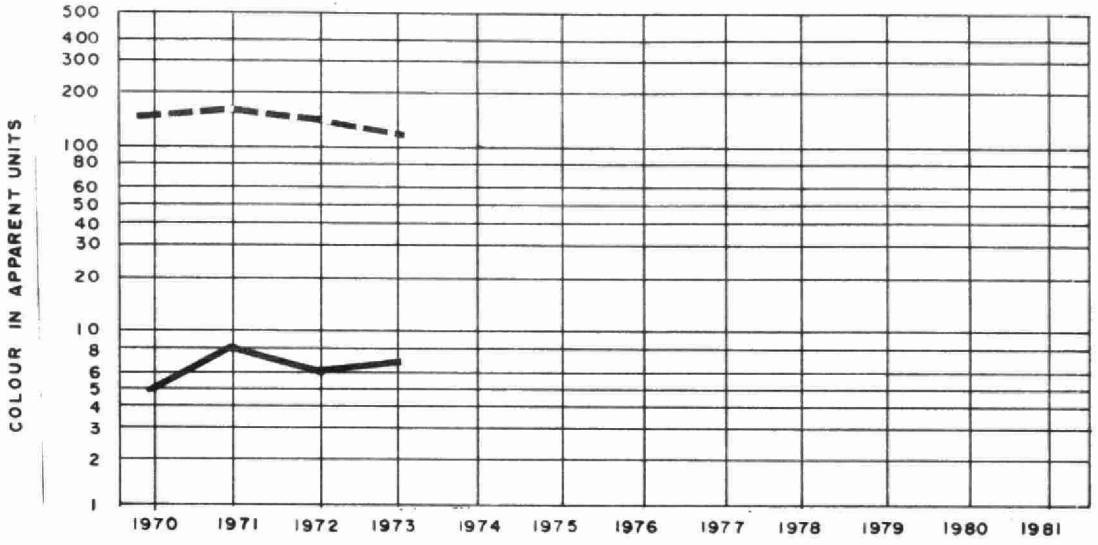
CHLORINATION and DISINFECTION

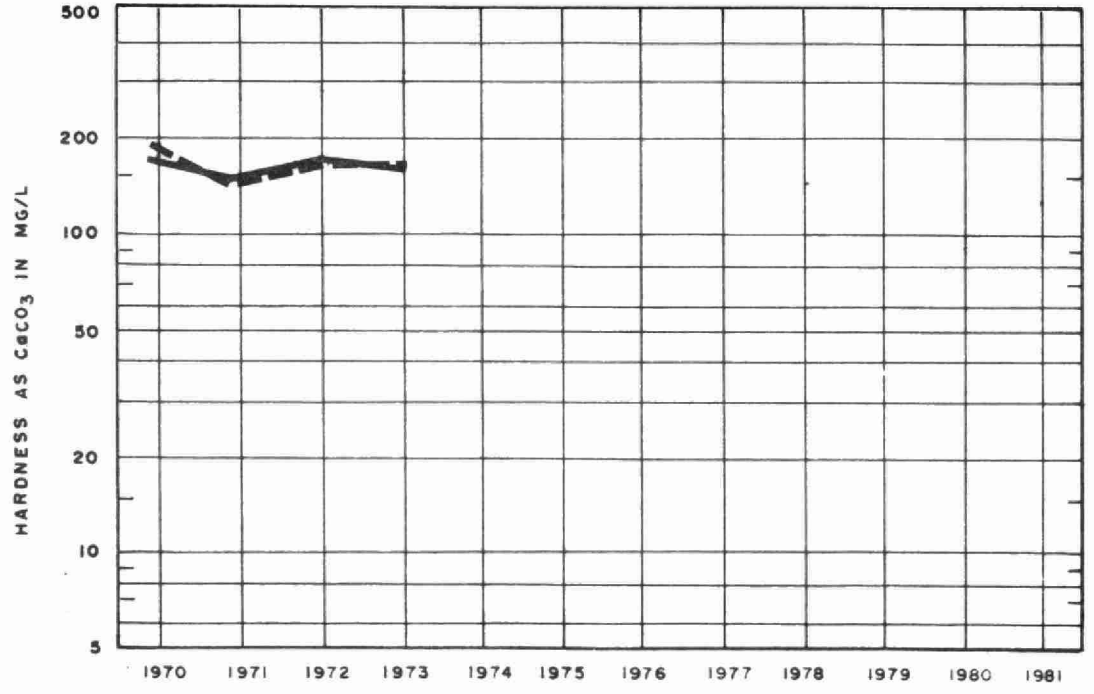
MONTH	RAW WATER					PLANT EFFLUENT		DISTRIBUTION SYSTEM		CHLORINATION			
	NUMBER OF SAMPLES HAVING TOTAL COLIFORM ORGANISMS PER 100 ml OF					NUMBER OF SAMPLES TAKEN	NUMBER HAVING COLIFORM ORGANISMS	NUMBER OF SAMPLES TAKEN	NUMBER HAVING COLIFORM ORGANISMS	TOTAL AMOUNT OF NaOCl gallons	DOSAGE		RESIDUAL IN PLANT EFFLUENT mg/l
	0	1 – 3	4 – 32	33 – 320	> 320						PRE – mg/l	POST – mg/l	
JAN	0	2	1	0	0	2	0	2	0	65		2.1	0.5
FEB	0	1	1	0	0	0	0	2	0	45		1.2	
MAR	1	0	1	0	0	2	0	0	0	65		1.8	0.5
APR	0	0	0	0	0	0	0	0	0	90		3.1	0.5
MAY	0	0	0	0	0	0	0	0	0	75		2.3	0.4
JUNE	0	0	0	0	0	0	0	0	0	75		2.6	0.5
JULY	0	0	2	0	0	2	0	0	0	110		3.9	0.5
AUG	0	1	0	0	0	1	0	0	0	100		3.8	0.5
SEPT	0	0	1	0	0	1	0	0	0	115		5.0	0.5
OCT	0	1	0	1	0	2	0	0	0	90		3.8	0.5
NOV	0	0	0	0	0	0	0	0	0	90		3.3	0.5
DEC	0	1	0	0	0	1	0	0	0	120		3.4	0.5
TOTAL	1	6	6	1	0	11	0	4	0	1040			
AVG.	4 (NOTE – Average shown is the GEOMETRIC MEAN)									3 gallons per day		2.9	0.5

TREATMENT DATA

MONTH	CHEMICALS USED										FILTER OPn	
	ALUM		SEPARAN		SODA ASH		FLUOSILICIC ACID		REACTOR SODA ASH		AVERAGE RUN hours	BACKWASH WATER mil. gal
	AMT. USED pounds	DOSE mg/l	AMT. USED pounds	DOSE mg/l	AMT. USED pounds	DOSE mg/l	AMT. USED gallons	DOSE mg/l	AMT. USED pounds	DOSE mg/l		
JAN	3200	84	30	0.8	1700	45	7.9	0.7	0	0	20	0.050
FEB	3700	95	27	0.7	1900	49	7.8	0.7	0	0	20	0.045
MAR	2200	50	17	0.4	1400	32	9.6	0.8	0	0	22	0.050
APR	1500	91	14	0.8	1200	85	10.4	1.0	0	0	16	0.072
MAY	3200	81	33	0.8	2300	58	13.4	1.2	0	0	16	0.074
JUNE	3200	92	30	0.9	2500	72	12.5	1.2	0	0	20	0.048
JULY	3700	108	36	1.1	2800	82	13.8	1.4	0	0	20	0.050
AUG	3300	103	32	1.0	1700	97	13.6	1.5	0	0	20	0.050
SEPT	3600	131	30	1.0	1600	109	10.9	1.4	0	0	20	0.048
OCT	3500	122	30	1.0	1700	109	12.0	1.5	0	0	20	0.050
NOV	4500	138	30	0.9	1800	92	10.4	1.1	0	0	20	0.048
DEC	4000	95	50	1.1	2500	74	12.4	1.0	0	0	20	0.050
TOTAL	39600		559		23100		134.7					0.635
AVG.		93		1.3		73		1.1			20	

WATER QUALITY





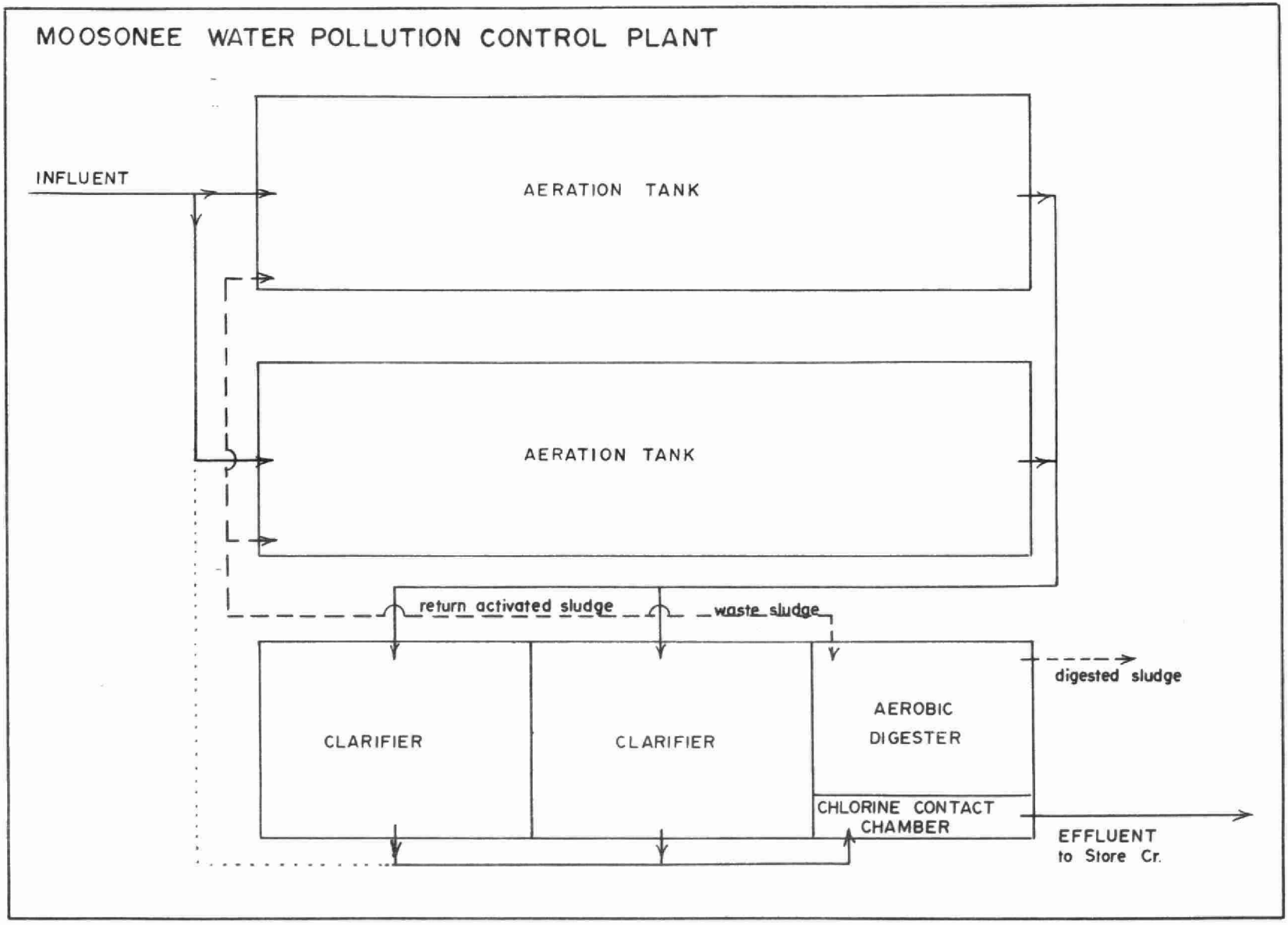
PLANT INFLUENT

PLANT EFFLUENT

WATER QUALITY

PROPERTY	RAW WATER				TREATED WATER				DESIRABLE STANDARDS
	NUMBER OF SAMPLES	AVERAGE	MAXIMUM	MINIMUM	NUMBER OF SAMPLES	AVERAGE	MAXIMUM	MINIMUM	
HARDNESS in mg/l as $CaCO_3$	20	174	364	30	19	168	340	36	80 – 100
ALKALINITY in mg/l as $CaCO_3$	20	163	316	22	19	172	314	51	30 – 100
IRON in mg/l Fe	20	0.76	1.20	0.30	19	0.14	0.70	<0.05	Less than 0.3
CHLORIDE in mg/l Cl^-	9	242	343	27	19	242	335	29	Less than 250
pH in pH units	20	7.6	8.0	7.1	19	7.5	7.9	6.6	7.0 – 8.5
FLUORIDE in mg/l F^-	16	0.3	0.6	0.1	382	1.0	3.7	0.6	Less than 1.2

— WATER POLLUTION CONTROL PLANT —


MOOSONEE WATER POLLUTION CONTROL PLANT
INFLUENT
AERATION TANK
AERATION TANK
return activated sludge
waste sludge
CLARIFIER
CLARIFIER
AEROBIC
DIGESTER
digested sludge
CHLORINE CONTACT
CHAMBER
EFFLUENT
to Storm Cr.

PROJECT NO. 1-0002-66
PROJECT NAME Moosonee WPCP
TREATMENT Extended Aeration

DESIGN FLOW 75,000 I. gal/day

DESIGN POPULATION 1,000

BOD - Raw Sewage 254 mg/l
- Removal 90%

SS - Raw Sewage 286 mg/l
- Removal 85%

PRELIMINARY TREATMENT

Comminution

Type: Chicago Pump Model 7B

EXTENDED AERATION

Aeration Tanks

Type: Diffused air, single pass
Size: Two 45.6" x 11' x 12'
(12,000 ft^3 or 75,000 gal)
Retention: 24 hours

Air Supply

Type: Hoffman
Size: Two 312 cfm

Diffusers

Type: Shearfusers
Spacing: 22/tank @24" centres

Sedimentation

Type: Smith & Loveless
Size: Two (18,400 gal)
Retention: 5.9 hours
Loading: Surface, 204 gal/ft^2/day
Weirs, 2250 gal/ft/day

CHLORINATION

One W & T V-800 400'b/day

Chlorine Contact Chamber

Size: 2430 gal
Retention: 48 minutes

SLUDGE HANDLING

Digestion System - Aerobic

Size: 1140 ft^3 or 7100 gal
Air Supply: 50 cfm
Diffusers: 7 Shearfusers

OUTFALL

To Store Creek (at junction of Moose River)

'73 Review

GENERAL

The project consists of a secondary sewage treatment plant and three pumping stations. The plant is a prefabricated field-erected unit designed to utilize either the contact stabilization process or extended aeration process. The plant has a capacity of 75,000 gallons per day using the extended aeration process and a capacity of 112,500 gallons per day using the contact stabilization process. It is presently operated as an extended aeration plant. The plant is totally enclosed in an insulated metal building. The treated effluent is discharged to Store Creek.

The project is operated by a chief operator and an operator who divide their duties between this project and the water treatment plant.

There were no major mechanical or process problems during the year.

PLANT FLOWS AND CHLORINATION

The average daily flow for the year was 48 thousand gallons, which is 64 per cent of the design capacity and represents an increase of 4 thousand gallons per day over the previous year. The design flow was exceeded 7 per cent of the time.

The final effluent was chlorinated from July 9 to November 4, and a total of 287.5 gallons of sodium hypochlorite solution was used giving an average chlorine dosage of 6.7 mg/l.

PLANT EFFICIENCY

The average raw sewage BOD and suspended solids concentrations were 110 mg/l and 238 mg/l respectively. The raw sewage BOD strength was 33 per cent less than in 1972 and the suspended solids concentration was 30 per cent less.

The average BOD and suspended solids concentrations in the treated effluent were 13 mg/l and 21 mg/l respectively which represent average BOD and suspended solids reductions of 88 per cent and 91 per cent respectively.

The BOD reduction was 6 per cent greater than last year and the suspended solids reduction was 3 per cent less.

AERATION

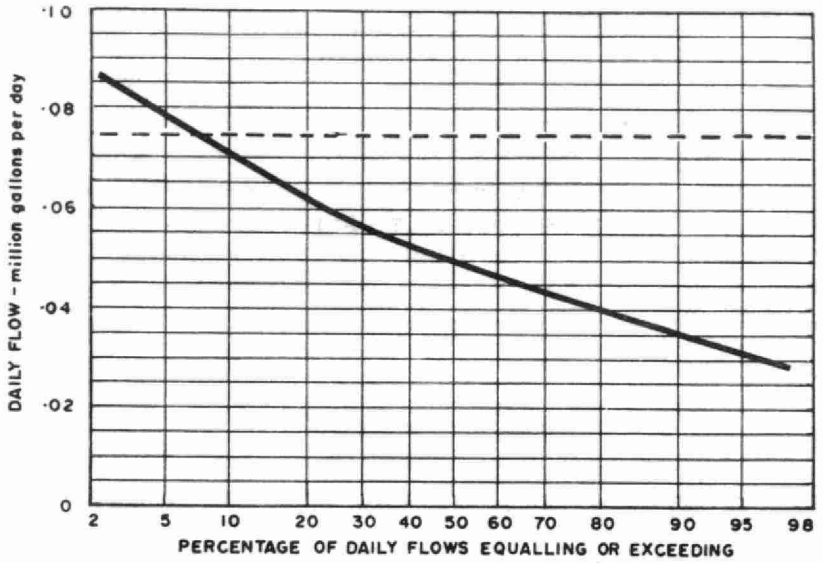
The average MLSS concentration of 4300 mg/l and the F/M ratio of 0.04 were within the acceptable limits for good operation of the aeration facilities.

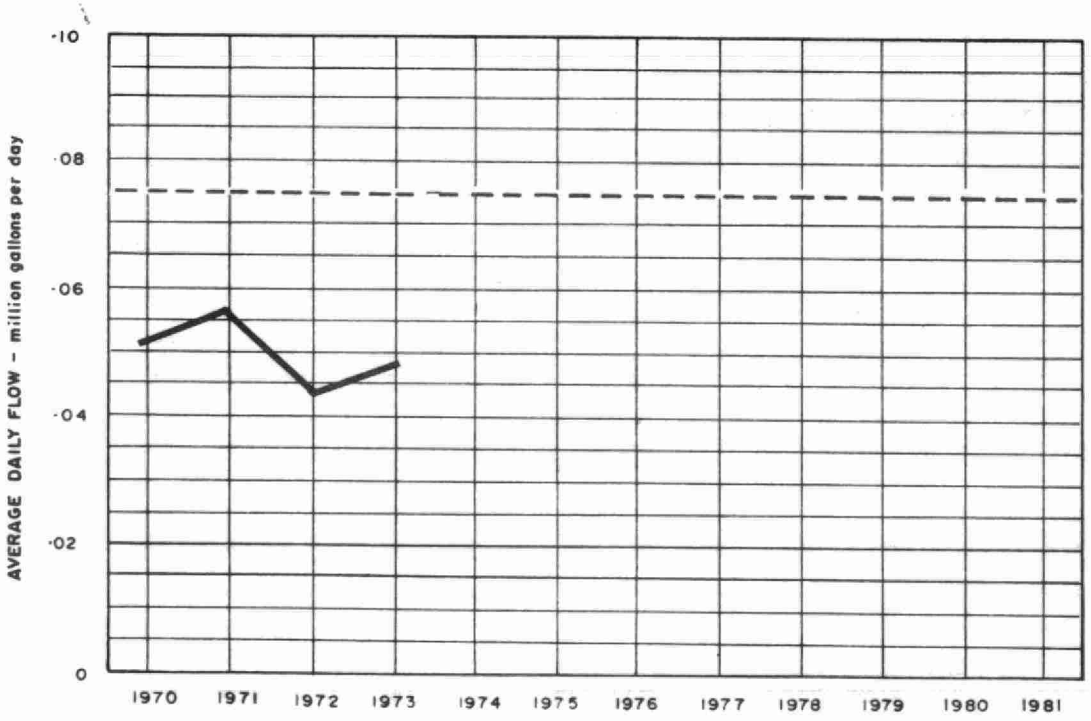
CONCLUSIONS

The general operation of the plant was quite satisfactory and the final effluent quality has improved significantly over the previous year.

PROCESS DATA

FLOWS



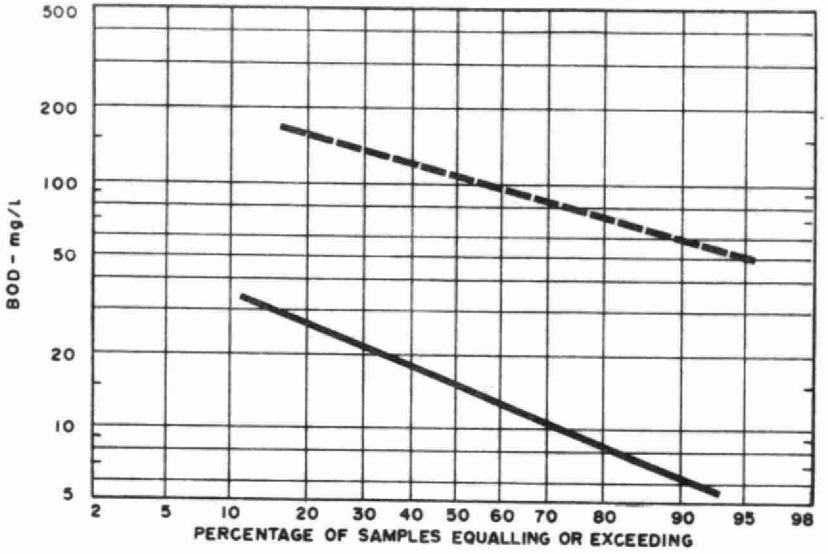


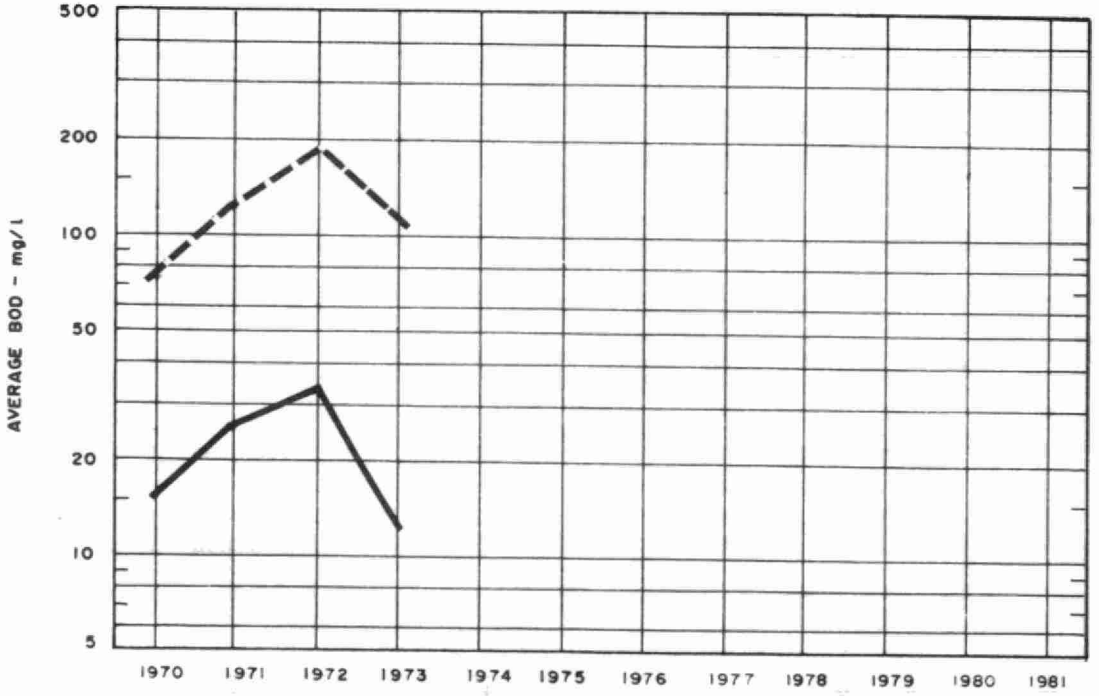
DESIGN CAPACITY _ _ _ _ _ _ _

PLANT PERFORMANCE

MONTH	FLOWS			BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				PHOSPHORUS	
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT
	million gallons	mil. gal	mgd	mg/l	mg/l	%	10^3 pounds	mg/l	mg/l	%	10^3 pounds	mg/l P	mg/l P
JAN	1.27	0.041	0.048	160	39	75	1.5	160	30	82	1.7	7.5	4.8
FEB	1.31	0.047	0.059	120	8	93	1.5	130	10	92	1.5	9.4	3.1
MAR	1.86	0.060	0.114	130	9	93	2.3	260	13	95	4.6	8.4	2.6
APR	1.51	0.050	0.069	120	23	80	1.4	220	20	91	2.9	8.3	2.9
MAY	1.97	0.064	0.130	100	16	85	1.8	200	15	93	3.8	6.4	1.8
JUNE	1.47	0.049	0.061	140	7	95	2.0	160	20	88	2.1	7.1	2.8
JULY	1.47	0.048	0.058	120	6	95	1.7	160	20	88	2.1	6.0	2.7
AUG	1.30	0.042	0.057					120	30	75	1.2	7.5	2.9
SEPT	1.26	0.042	0.052	170	9	95	2.0	180	10	94	2.1	8.8	4.1
OCT	1.30	0.042	0.057	50	9	82	0.5	850	35	96	10.5	8.8	3.8
NOV	1.38	0.046	0.062	78	6	92	1.0	86	33	62	0.7	5.0	1.4
DEC	1.52	0.049	0.064	65	11	83	0.8	90	10	89	1.2	5.2	1.0
TOTAL	17.62	-	-	-	-	-		-	-	-	34.4	-	-
AVG.		0.048	MAXIMUM 0.130	110	13	88	1.5	238	21	91	2.9	7.5	2.9
No. of Samples	-	-	-	18	19	-	-	19	20	-	-	19	20

BIOCHEMICAL OXYGEN DEMAND

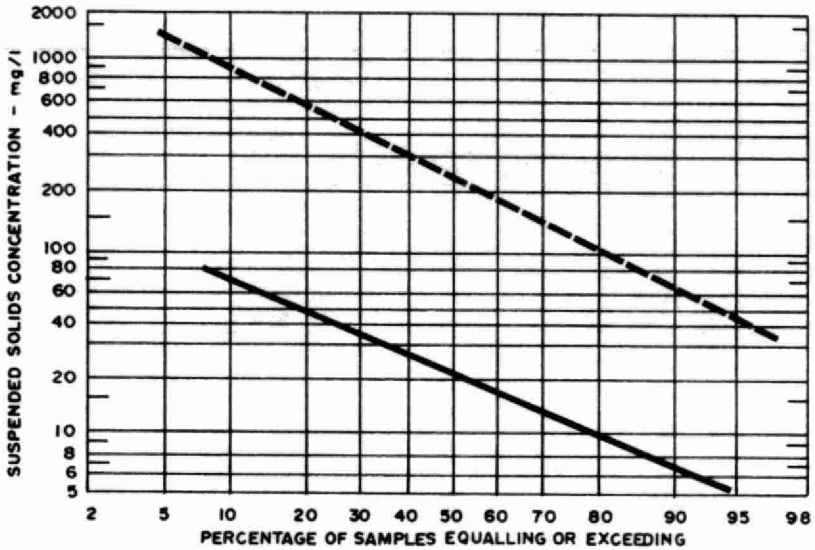


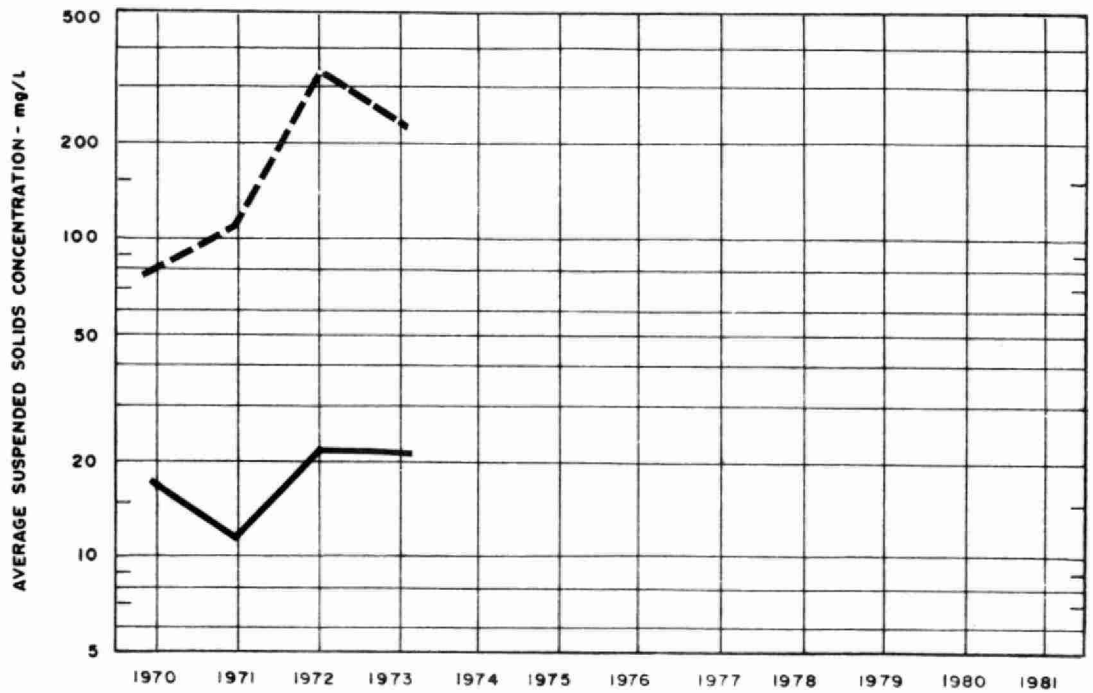


PLANT INFLUENT

PLANT EFFLUENT

SUSPENDED SOLIDS

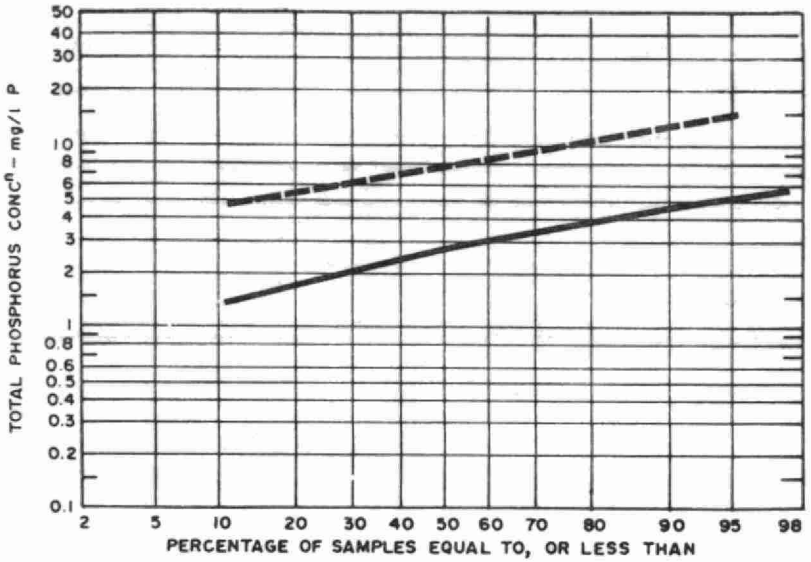


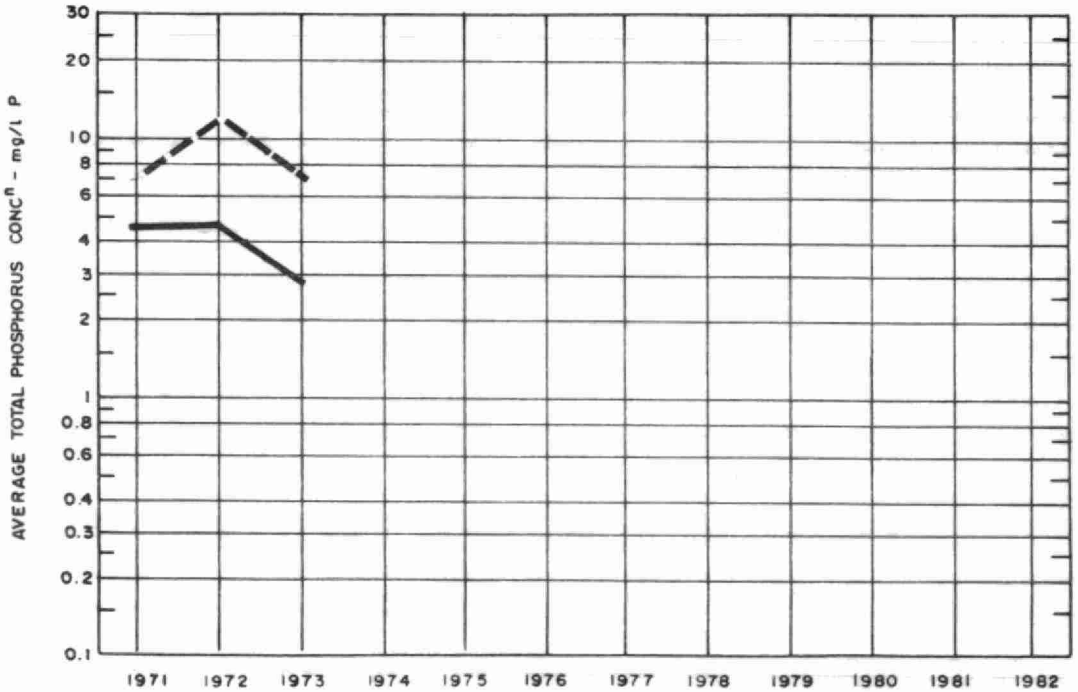


PLANT INFLUENT

PLANT EFFLUENT

PHOSPHORUS





PLANT INFLUENT

PLANT EFFLUENT

TREATMENT DATA

MONTH	GRIT	CHLORINATION		AERATION			WASTE SLUDGE			AEROBIC DIGESTER			
	QUANTITY REMOVED cubic feet	NaOCl gallons	AVG. DOSAGE mg/l	MLSS. CONC mg/l	F/M day^{-1}	AIR USED $\frac{1000\ ft^3}{lb\ BOD}$	QUANTITY 10^3 gallons	SUSPENDED SOLIDS mg/l	VOL. SOLIDS %	QUANTITY REMOVED 10^3 gallons	SUSPENDED SOLIDS mg/l	VOL. SOLIDS %	AMOUNT HAULED cubic yards
JAN	0	0				3.0							
FEB	0	0		1100	0.10	3.0							
MAR	0	0				2.4							
APR	0	0		3600	0.02	3.4		4600	53				
MAY	0	0		2400	0.04	2.3		4000	55				
JUNE	0	0		3900	0.02	3.5							
JULY	0	37.5	4.1	5700	0.14	4.6		7300	52				
AUG	0	87.5	8.1	5400				8600	50				
SEPT	0	75.0	7.1	7300	0.01	3.9		9600	48				
OCT.	0	77.5	7.2	6600	0.004	15.2		8200	52				
NOV	0	10.0	6.3	4000	0.01	7.8		6300	57				
DEC	0			2800	0.02	9.6		5000	66				
TOTAL	0	287.5	–	–	–	–		–	–		–	–	
AVG.	cu. ft/mil gal		6.7	4300	0.04	5.3		6700	54				